



Ministry of Higher Education and
Scientific Research - Iraq
Al-Mansour University College
Department of Communication Engineering



الملحق 4: وصف المادة الدراسية

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information					
معلومات المادة الدراسية					
Module Title	Digital Image Processing			Module Delivery	
Module Type	Core			☒ Theory ☐ Lecture ☒ Lab ☒ Tutorial ☐ Practical ☐ Seminar	
Module Code	COM 36108				
ECTS Credits	4				
SWL (hr/sem)	100				
Module Level	UGIII	Semester of Delivery			
Administering Department	BSc - COMM	College	Al-Mansour University College		
Module Leader			e-mail		
Module Leader's Acad. Title			Module Leader's Qualification		
Module Tutor			e-mail		
Peer Reviewer Name	Name	e-mail			
Scientific Committee Approval Date	13-9-2025	Version Number	1.0		

Relation with other Modules			
العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	Semester	
Co-requisites module	None	Semester	



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Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Objectives أهداف المادة الدراسية	The course objectives are: 32. 1. Provide the student with the fundamentals of digital image processing 33. 2. Give the students a taste of the applications of the theories taught in the subject. This will be achieved through the project and some selected lab sessions. 34. 3. Introduce the students to some advanced topics in digital image processing. 35. 4. Providing students with a useful skill base and experience that will enable them to continue their studies and work in this field.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Upon Successfully completing the course, the student should: 1. Have an appreciation of the fundamentals of Digital Image Processing including the topics of filtering, transforms and morphology, and image analysis and compression 2. Be able to implement basic image processing algorithms in MATLAB. 3. Have the skill base necessary to further explore advanced topics of Digital Image Processing. 4. Be in a position to make a positive professional contribution in the field of Digital Image Processing. 5. At the end of the course the student should have a clear impression of the breadth and practical scope of Digital Image Processing and have arrived at a level of understanding that is the foundation for most of the work currently underway in this field.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. • Course introduction (2 hrs) • Working with tutorial (15 hrs) • Theoretical lectures (30 hrs) • Lap (28 hrs)
Description	This module introduces the fundamental concepts of digital image processing. The course covers the principles of operations and methods that deal with images and frames to extract and enhance features. Also, the course will provide an introduction to filtration methods. Basic types of image are studied, including binary images, color images, grayscale images and special types such as x-ray images with emphasis on their characteristics and practical applications in communication systems. All processes will help the student to understand one of the most types of information transmitted.



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Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	In this course, students are guided by: • Using different examples of images and frames. • Using different styles of discussion that aim to connect the theoretical and practical sides. • Asking questions and giving exercises that require analysis and conclusions related to lectures. • Encourage students to participate in discussions and do the practical work. • Encourage students to work in groups.
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Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	78	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	22	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	1.5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	100		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (5)	6 and 12	LO #1 to #3 and #4 to #6
	Assignments	2	10% (5)	2 and 13	LO #3 to #6



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	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO #3, #4 and #6
Summative assessment	Midterm Exam	2hr	10% (10)	9	LO #1 - #5
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction to image processing, definitions, computer imaging, major topics of image processing, The origins of Image processing, digitization, The image types, The fields that used the digital image processing.
Week 2	Digital Image File Format, Multispectral images, Fundamental steps in digital image processing, Components of Image processing system, Image processing techniques, Image Algebra.
Week 3	Image Sampling and Quantization, Spatial and Gray-level Resolution, Effect of reducing the spatial resolution, Effect of reducing the gray-level resolution, Basic relationships between pixels.
Week 4	Intensity Transformation Functions, Histogram Processing, Fundamentals of Spatial Filtering, Smoothing Spatial Filters, Sharpening Spatial Filters, Combining Spatial Enhancement Methods.
Week 5	
Week 6	Image Compression by Discrete Cosine Transform. A Model of the Image Degradation/Restoration Process, Noise Models, Restoration in the Presence of Noise Only, Minimum Mean Square Error (Wiener) Filtering, Constrained Least Squares Filtering, Geometric Mean Filter.
Week 7	
Week 8	
Week 9	Noise filtering: median, mean, Low pass, Linear Minimum Mean Squared Error (LMMSE), Directional Spatial.
Week 10	
Week 11	Mid exam.
Week 12	Color Models, Color Transformations, Smoothing and Sharpening, Noise in Color Images, Color Image Compression.



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Week 13	Fourier Analysis – Shortcomings, Wavelet Transforms, CWT, and DWT, One Dimension (1D) DWT, Multi-Resolution 2D Wavelet Transforms, Different Decomposition Schemes, Statistical Properties of Wavelet subbands and Applications of DWT.
Week 14	
Week 15	

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Introduction to MATLAB environment with a summary of MATLAB commands used and apply instructions of reading image, displaying image.
Week 2	Image transformation, information, size, resize, zoom.
Week 3	Image Addition, Subtraction, Multiplication, Division and logical operations.
Week 4	Image Histogram
Week 5	Image Scaling & Rotation
Week 6	Edge detection Algorithm
Week 7	Image Enhancement-Spatial filtering
Week 8	Image segmentation – Edge detection, line detection and point detection.
Week 9	Region based Segmentation
Week 10	Analysis of images with different color models
Week 11	DFT analysis of images.
Week 12	Image restoration
Week 13	Image compression techniques
Week 14	Analysis of spatial and intensity resolution of images
Week 15	Examination

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	- Digital Image Processing- Rafeal C. Gonzalez, Richard E. Woods, 3rd Edition, Pearson, 2008. - Digital Image Processing- S Jayaraman, S. Essakkirajan, T. Veerakumar-TMH, 2010	Yes



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Recommended Texts	• Introduction to Digital Image Processing with Matlab, Alasdair McAndrew, Thomson Course Technology • Digital Image Processing using Matlab, Rafeal C. Gonzalez, Richard E. Woods, Steven L. Eddins, Pearson Education.	No
Websites	None.	

Grading Scheme

مخطط الدرجات

Group	Grade	التقدير	Marks %	Definition
Success Group (50 - 100)	A - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	FX – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails," so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.